REMARKS

Claims 1-52 are pending in the above identified application. The Examiner has rejected claims 1-8, 10-20, 27-40, and 43-52 and objected to claims 9, 21-26, 41, and 42. Applicant has amended claims 1, 2, 15, 16, 19, 27, 34, 44, 45, 46, 48, and 51 and canceled claims 12, 18, and 36. No new matter has been added by these amendments.

Objections to the Drawings

The Examiner has objected to the drawings because "Figures 1A-1C should be designated by a legend such as --Prior Art-- because only that which is old is illustrated." (Office Action, page 2). Applicant has amended drawings 1A through 1C accordingly.

The Specification

The Examiner has requested Applicant's cooperation in correcting any errors of which applicant may become aware in the specification. (*See* Office Action, page 2). Applicant has reviewed the specification and has not made any amendments herein.

Objections to the Claims

The Examiner has objected to claim 46 and suggests that "applicant insert 'to' between coupled and received in line 5 of the claim." (Office Action, page 2). Applicant has made the requested amendment to claim 46.

Claim Rejections under 35 U.S.C. § 102

The Examiner states that claims 1-6, 12, 15, 27, 29-31, 34, 36-37, and 44-45 are rejected "under 35 U.S.C. 102(b) as being anticipated by Rowan et al. (WO 99/45683)." (Office Action,

page 3). However, the Examiner addresses claims 1-6, 12-15, 19-20, 27-40, and 43-45 in the discussion of the rejections under 35 U.S.C. § 102(b). (*See* Office Action, page 3-8).

Rowan teaches "[a] system [that] transmits digital data over an optical fiber at high aggregate data rates and high bandwidth efficiencies." (Rowan, abstract). As stated in Rowan,

> [i]n accordance with the present invention, a system for transmitting digital data over an optical fiber includes a modulation stage, a frequency division multiplexer, and an optical modulator. The modulation stage receives a plurality of digital data channels and applies QAM modulation to produce a plurality of QAM-modulated signals. The frequency division multiplexer combines the QAM-modulated signals by frequency division multiplexing them into an RF signal. The RF signal is input to the optical modulator, which generates an optical signal modulated by the RF signal, for transmission over an optical fiber.

(Rowan, page 3, lines 22-28). Further, Rowan teaches that

> [i]n accordance with another aspect of the invention, a system for receiving digital data over an optical fiber includes a detector, a frequency division multiplexer, and a demodulation stage. The detector detects the optical signal produced by the transmitter system described previously, producing an RF signal. The frequency division demultiplexer separates the RF signal into its constituent QAM-modulated signals by frequency division demultiplexing. The demodulation stage converts the QAM-modulated signals into the original digital data channels.

(Rowan, page 4, lines 11-17). Therefore, Rowan teaches frequency-division multiplexing of QAM modulated signals over an optical fiber. Rowan does not teach "the transmitter coupled to . . . transmit the N parallel bits of data into K frequency separated channels on a conducting transmission medium," as is recited in claim 1, "coupling the transmit sum signal to the conducting transmission medium," as is recited in claim 27, "means for transmitting . . . into one of K channels on a conducting transmission medium," as is recited in claim 44, or "the transmitter portion coupled to . . . transmit the N parallel bits of data into a first set of K frequency separated channels on a conducting transmission medium," as is recited in claim 46.

Instead, Rowan teaches transmission over optical fiber rather than over "a conducting transmission medium." .

As stated in Rowan,

> [t]he present invention is particularly advantageous because the combination of QAM modulation and frequency division multiplexing allows the transmission of digital data over optical fibers at high aggregate data rates and with high bandwidth efficiencies while using lower speed electronics. For example, the preferred embodiment described above has an aggregate data rate of approximately 10 Gbps and a bandwidth efficiency of approximately 4 bps/Hz, but the associated electronics need only support the 155 Mbps OC-3 data rate rather than the 10 Gbps aggregate rate.

(Rowan, page 4, lines 18-24). Rowan's teaching regarding transmission over optical fiber at these data rates is not applicable to transmission over conducting transmission medium because of the more prominent affects of distortions that are observed in the conducting transmission medium.

Without addressing each of the statements made by the Examiner in support of the Examiner's rejections, Applicant disagrees and does not acquiesce to the Examiner's analysis of Rowan. For example, the Examiner has incorrectly identified element 914A in Figure 9B of Rowan as an Equalizer, which corrects the signal for intersymbol interference (one of the distortions that is prevalent in transmission over conducting transmission medium but not over optical fiber). (*See* Office Action, page 5). As stated by the Examiner,

> [f]urthermore, Rowan et al. also discloses in Figs. 9B, 11 wherein at least one of the K demodulators comprises: a down-conversion circuit (912A) that receives the signal from the transmission medium and generates a symbol by converting the signal at the carrier frequency appropriate for the one of the K demodulators; an equalizer circuit (914A) coupled to receive the symbol from the down-conversion circuit and create an equalized symbol; and a decoder (1100) which receives the equalized symbol and retrieves the one of the K subsets of bits associated with the at least one of the K demodulators.

(Office Action, page 5). As taught in Rowan, "[b]andpass filters 914 filter out the signal at the common carrier frequency." (Rowan, page 14, line 24). Therefore, the element identified by the Examiner as an equalizer is simply a bandpass filter. An equalizer corrects the signal for intersymbol interference and therefore a bandpass filter is not an equalizer.

The Examiner also cites page 7, lines 4-21, of Rowan as evidence that Rowan "discloses in Fig. 9B, an analog-to-digital converter coupled between the down converter and the equalizer." (Office Action, page 5) However, equalization is not mentioned in that paragraph. Further, in Figure 9B, the bandpass filter 914 (identified by the Examiner as the Equalizer) is located before the analog-to-digital converter.

As another example, the Examiner further cites Fig. 9B for disclosing "anti-aliasing filtering prior to analog-to-digital conversion." (Office Action, page 7). However, there is no teaching in Rowan regarding anti-aliasing filtering. Rowan only teaches the bandpass filter 914.

Therefore, as discussed above, Rowan does not teach "the transmitter coupled to . . . transmit the N parallel bits of data into K frequency separated channels on a conducting transmission medium," as is recited in claim 1, "coupling the transmit sum signal to the conducting transmission medium," as is recited in claim 27, "means for transmitting . . . into one of K channels on a conducting transmission medium," as is recited in claim 44, or "the transmitter portion coupled to . . . transmit the N parallel bits of data into a first set of K frequency separated channels on a conducting transmission medium," as is recited in claim 46. Instead, Rowan teaches transmission of data over optical fiber. Further, Rowan does not teach "an equalizer circuit" as is recited in claim 19 or an "anti-aliasing filter" as is recited in claim 40. Therefore, claims 1, 27, 44, and 46 are allowable over Rowan. Further, claims 19 and 40 are allowable over Rowan.

Claims 2-6, 12-15, and 19-20 depend, directly or indirectly, from claim 1 and are therefore allowable over Rowan for at least the same reasons as is claim 1. Claims 28-40 and 43 depend, directly or indirectly, from claim 27 and are therefore allowable over Rowan for at least the same reasons as is claim 27. Claim 45 depends from claim 44 and is therefore allowable over Rowan for at least the same reasons as is claim 44. Claim 47-50 depend, directly or indirectly, from claim 46 and are therefore allowable over Rowan for at least the same reasons as is claim 46. Therefore, claims 1-6, 12-15, 19-20, 27-40, and 43-50 are allowable over Rowan.

Claim Rejections Under 35 U.S.C. § 103

Claims 7-8 and 10-11

The Examiner rejected claims 7-8 and 10-11 "under 35 U.S.C. 103(a) as being unpatentable over Rowan et al. (WO 99/45683) as applied to claims 1 and 4 above in view of Frenkel (US Patent 5,838,268). (Office Action, page 8). Applicant disagrees with the Examiner because 1) the combination of Frenkel and Rowan do not teach the elements of the claims, as is suggested by the Examiner; and 2) there is no motivation to combine the teachings of Frenkel and Rowan.

Further, Applicant does not agree with the Examiner's analysis of Frenkel and does not acquiesce to the Examiner's comments, whether or not those comments are specifically discussed here. As an example, the Examiner cites to col. 8, lines 39-51 of Frenkel to show that Frenkel teaches a transmission medium is a copper backplane and the transmitter includes a differential output driver and that Frenkel teaches that the transmission medium is FR4 copper trace and the transmitter includes a differential output driver. (Office Action, page 9). Frenkel simply states that "the demodulation system of FIG. 2 are particularly suitable for packetized data-over-cable applications such as coax and HFC (hybrid fiber coax) applications . . . ."

(Frenkel, col. 8, lines 46--48). No teaching of a differential output, transmission over FR4 copper, or transmission over a copper backplane is provided, as is stated by the Examiner.

1. The combination of Rowan with Frenkel does not teach the elements of the claims.

As stated above, all of the elements of claims 1 and 4 are not taught by Rowan. Further, Frenkel does not cure the defects in the teachings of Rowan. Frenkel teaches

> [a] signal modulation method comprising receiving at least first and second synchronized incoming streams of complex symbols, thereby to define a plurality of incoming vectors each including at least first and second synchronized complex symbols, mapping each complex symbol into a signal component comprising a linear combination of an in-phase signal and a quadrature signal, the quadrature signal comprising a Hilbert transform of said in-phase signal, wherein all of the signal components are substantially mutually orthogonal and wherein the frequency spectrums of all signal components mapped from a single incoming stream are centered around a common frequency location which is unique to the single incoming stream and wherein the frequency spectrum of signal components mapped from different incoming streams having adjacent common frequency locations are partially overlapping and wherein signal components mapped from sequential incoming symbols partially overlap in time and combining all of the signal components into a representation of an output signal.

(Frenkel, abstract). Therefore, Frenkel teaches that each individual symbol stream is transmitted at a unique carrier frequency. Therefore, the combination of Frenkel and Rowan does not teach "the transmitter coupled to . . . transmit the N parallel bits of data into K frequency separated channels on a conducting transmission medium," as is recited in claim 1. Therefore, the combination of Frenkel with Rowan still does not teach the elements of claims 7-8 and 10-11, which depend either directly or indirectly from claim 1.

2. There is no motivation to combine the teachings of Rowan and Frenkel.

Further, there is no motivation to combine the teaches of Rowan with that of Frenkel, as is suggested by the Examiner. Rowan teaches "[a] system [that] transmits digital data over an optical fiber at high aggregate data rates and high bandwidth efficiencies." (Rowan, abstract). Frenkel teaches "improved methods and apparatus for modulating and demodulating data." Frenkel, col. 2, lines 25-26). As stated in Frenkel,

> [o]ne object of a preferred embodiment of the present invention is to provide a modulation/demodulation scheme with improved bandwidth efficiency, sharp ingress rejection, robustness to time and phase errors and low latency, which is therefore suitable for reliable continuous transmission of packets in multi-point systems such as HFC (hybrid fiber coax).

(Frenkel, col. 2, lines 27-33). Further, Frenkel's modulation scheme operates on a single bit stream and not on a set of parallel bits, as is taught in Rowan. (*See, e.g.,* Frenkel, Figure 1). One of ordinary skill in the art would not be motivated to combine teachings related to transmission over optical fiber with transmission over a conducting transmission medium.

Therefore, claims 7-8 and 10-11, which depend directly or indirectly from claims 1 and 4, are therefore allowable over the combination of Rowan and Frenkel.

<u>Claims 16, 17, and 18</u>

The Examiner has further rejected claims 16, 17, and 18 "under 35 U.S.C. 103(a) as being unpatentable over Rowan et al. (WO 99/45683) as applied to claim 15 above in view of van Nguyen (US Patent 6,462,679 B1)." (Office Action, page. 9). Applicant does not agree or acquiesce to the Examiner's characterization of Nguyen.

Claim 18 has been canceled.

Claims 16 and 17 depend, directly or indirectly, from claim 1, which as discussed above is allowable over Rowan. Nguyen does not cure the defects in the teachings of Rowan. Nguyen teaches "a method for modulating a signal that includes generating a sinusoidal wave signal and

encoding each half wave cycle of the sinusoidal wave signal with digital data." (Nguyen, col. 1, lines 64-66). Nguyen does not teach "the transmitter coupled to . . . transmit the N parallel bits of data into K frequency separated channels on a conducting transmission medium," as is recited in claim 1.

Further, there is no motivation to combine Rowan with Frenkel. Rowan teaches a complex modulation scheme for transmission of optical signals over fiber optic cable. Frenkel teaches encoding digital data in the amplitudes of the sine wave. One skilled in the art would not be motivated to combine the teachings of Frenkel with that of Rowan.

Claims 46-52

The Examiner has rejected claims 46-52 "under 35 U.S.C. 103(a) as being unpatentable over Rowan et al. (WO 99/45683) in view of Widmer (US Patent 6,496,540 B1)." As before, whether or not discussed below, Applicant does not agree or acquiesce to the Examiner's characterization of Widmer.

As discussed above, claim 46 is allowable over Rowan. Widmer does not cure the defects in the teachings of Rowan. Widmer teaches "a system and method for transforming uncoded parallel interfaces into coded format while maintaining a baud-rate of the uncoded parallel interface." (Widmer, col. 4, lines 34-36). As is shown in Figure 1 and the accompanying discussion, Widmer shows a system where parallel data streams are input, processed, and output on individual transmission lines so as to maintain the baud rate. (*See* Widmer, col. 4, line 64, to col. 5, line 1). Therefore, Widmer does not teach "the transmitter portion coupled to . . . transmit the N parallel bits of data into a first set of K frequency separated channels on a conducting transmission medium," as is recited in claim 46. Claim 46, therefore, is allowable over the combination of Rowan and Widmer. Claims 47-52 depend from claim 46

and are therefore allowable over the combination of Rowan and Widmer for at least the same reasons as is claim 46.

Further, there is no motivation to combine Rowan with Widmer. Rowan teaches a complex modulation scheme for transmission of data "over an optical fiber at high aggregate data rates and high bandwidth efficiencies." (Rowan, abstract). Widmer teaches recombining data streams in order to maintain the baud rate. One skilled in the art would not be motivated to combine the teachings of Rowan with those of Widmer.

Allowed Subject Matter

The Examiner has allowed claims 9, 21-26, and 41-42, provided that they are rewritten in independent form including all of the limitations of the base claims and any intervening claims. As discussed above, the base claims and intervening claims are allowable. Therefore, claims 9, 21-26, and 41-42 have not been amended to be independent in this paper.

Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: August 10, 2005

By: ____________________
Gary J. Edwards
Reg. No. 41,008

Attachments: Annotated Sheet of Drawings showing changes

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FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.
1300 I STREET, N.W.
WASHINGTON, DC 20005-3315

EXAMINER	
WILLIAMS, LAWRENCE B	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

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FINNEGAN, HENDERSON, FARABOW,
GARRETT

Docketed 3-14-05 Attorney CLO/GJE
Case 09146.0001
Due Date 6-10-05/w ext
Action Resp. Due
By JDJ

Office Action Summary	Application No.	Applicant(s)
	09/904,432	RAGHAVAN, SREEN
	Examiner	**Art Unit**
	Lawrence B Williams	2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-20,27-40 and 43-52* is/are rejected.

7)☒ Claim(s) *9,21-26,41 and 42* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 Februrary 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1A-1C should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

3. Claim 46 is objected to because of the following informalities: Examiner suggests applicant insert "to" between coupled and receive in line 5 of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-6, 12, 15, 27, 29-31, 34, 36-37, 44-45 are rejected under 35 U.S.C. 102(b) as being anticipated by Rowan et al. (WO 99/45683).

(1) With regard to claim 1, Rowan et al. discloses in Figs. 1, a communication system, comprising: a transmitter (102), the transmitter coupled to receive N parallel bits of data and transmit the N parallel bits of data into K frequency separated channels (110A-110N) on a transmission medium (104), where N and K are integers; and a receiver (106) coupled to receive data from the K frequency separated channels from the transmission medium and recover the N parallel bits of data (pg. 3, line 22 –pg. 4, line 10).

(2) With regard to claim 2, claim 2 inherits all limitations of claim 1, above. Furthermore, Rowan et al. also discloses in Fig. 2-5, wherein the transmitter comprises a bit allocation circuit (200) that receives the N parallel bits of data and creates K subsets of data bits; and K modulators, wherein each of the K modulators (330A-K) encodes one of the K subsets of the N parallel bits of data and creates an output signal modulated at a carrier frequency associated with one of the K frequency separated channels; and an adder (502) that receives the output signal from each of the K modulators and generates a transmit sum signal (212) for transmission on the transmission medium (pg. 6, line 28- pg. 7, line 21).

(3) With regard to claim 3, claim 3 inherits all limitations of claim 2 above. Furthermore, Rowan et al. also discloses in Figs. 3, 5 wherein at least one of the K modulators includes a data encoder (302A) that receives the one of the K subsets of the N parallel bits of data associated with the at least one of the K modulators and outputs an encoded signal; a symbol mapper (Though Rowan et al. is silent as to a symbol mapper, it is well known in the art that QAM incorporate use of a symbol mapper) coupled to receive the encoded signal and output a symbol; and an up-converter (500A-500K) coupled to receive symbols from the symbol mapper and generate the output signal, wherein the up-converter (Fig. 8) outputs data at the carrier frequency of one of the K frequency separate channels that corresponds with the at least one of the K modulators (pg. 4, lines 1-10).

(4) With regard to claim 4, claim 4 inherits all limitations of claim 3. Furthermore, Rowan et al. also discloses the system, further including a digital-to-analog converter coupled between the symbol mapper and the up-converter (pg. 9, line 25-pg. 10, line 2).

(5) With regard to claim 5, claim 5 inherits all limitations of claim 3 above. Furthermore, Rowan et al. also discloses in Fig. 4, wherein the data encoder is a trellis encoder (406).

(6) With regard to claim 6, Rowan et al. also discloses wherein the symbol mapper is a QAM symbol mapper, which maps the encoded output signal into a symbol that includes an in-phase signal and a quadrature signal (pg. 9, lines 17-24).

(7) With regard to claim 12, Rowan et al. also discloses wherein the transmission medium is optical fiber and the transmitter includes an optical output device (pg. 5, lines 20-22; pg. 12, lines 1-9).

(8) With regard to claim 13, Rowan et al. also discloses wherein a subset of bits at a lower carrier frequency contains fewer bits than a subset of bits associated with a higher carrier frequency (pg. 7, lines 4-21).

(9) With regard to claim 14, Rowan et al. also discloses wherein each of the K subsets of data bits includes the same number of data bits (pg. 7, lines 22-27).

(10) With regard to claim 15, claim 15 inherits all limitations of claim 2 above. Furthermore, Rowan et al. also discloses in Figs. 12, 13 wherein the receiver comprises: K demodulators (1000A-K), each of the K demodulators coupled to receive a signal from the transmission medium (712A-K), the signal being the transmit sum signal transmitted through the transmission medium, and retrieving one of the K subsets of data bits; and a bit parsing circuit (1003) that receives each of the K subsets of data bits from the K demodulators and reconstructs the N data bits transmitted by the transmitter (pg. 15, lines 3-12).

(11) With regard to claim 19, claim 19 inherits all limitations of claim 15, above. Furthermore, Rowan et al. also discloses in Figs. 9B, 11 wherein at least one of the K demodulators comprises: a down-conversion circuit (912A) that receives the signal from the transmission medium and generates a symbol by converting the signal at the carrier frequency appropriate for the one of the K demodulators; an equalizer circuit (914A) coupled to receive the symbol from the down-conversion circuit and create an equalized symbol; and a decoder (1100) which receives the equalized symbol and retrieves the one of the K subsets of bits associated with the at least one of the K demodulators.

(12) With regard to claim 20, Rowan et al. also discloses in Fig. 9B, an analog-to-digital converter coupled between the down-converter and the equalizer (pg. 7, lines 4-21).

(13) With regard to claim 27, claim 27 inherits all limitations of claim 1, above as claim 27 cites the method of the system disclosed in claim 1. Furthermore, Rowan et al. discloses in Figs. 1-5, a method of communicating between components over a transmission medium, comprising: separating N bits into K subsets of bits; encoding each of the K subsets of bits to form encoded subsets of bits; mapping each of the K encoded subsets of bits onto a symbol set to generate a K symbols representing each of the K subsets of bits; up-converting each of the K symbols to form an up-converted signal at one of a set of K carrier frequencies; summing the up-converted signals representing each of the K subsets of bits to generate a transmit sum signal; and coupling the transmit sum signal to the transmission medium (pg. 5, lines 20- pg. 6, line 4).

(14) With regard to claim 28, Rowan et al. also discloses wherein symbols transmitted at lower carrier frequencies represent fewer bits than symbols transmitted at higher carrier frequencies (pg. 7, lines 4-21).

(15) With regard to claim 29, claim 29 inherits all limitations of claim 27, above. Furthermore, Rowan et al. discloses in Fig. 4, wherein encoding each of the K subsets of bits includes encoding at least one of the K subsets of bits with a trellis encoder.

(16) With regard to claim 30, Rowan et al. also discloses wherein mapping each of the encoded subsets of bits includes QAM mapping (pg. 9, line 17-24).

(17) With regard to claim 31, Rowan et al. also discloses the method further including converting the K symbols to analog signals (pg. 9, line 25 - pg. 10, line 2).

(18) With regard to claim 32, Rowan et al. also discloses in Fig. 9B, providing digital filtering prior to converting the K symbols to analog signals (pg. 7, lines 4-21).

(19) With regard to claim 33, Rowan et al. also discloses in Fig. 9B, providing analog digital filtering prior to converting the K symbols to analog signals (pg. 7, lines 4-21).

(20) With regard to claim 34, claim 34 inherits all limitations of claim 27 above. Furthermore, Rowan et al. also discloses receiving a receive sum signal from the transmission medium; down-converting the received sum signal into a set of K signals; equalizing each of the K signals to receive equalized symbols; decoding the equalized symbols to reconstruct the K subsets of bits; and parsing K subsets of bits into N bits (pg. 14, lines 1-21).

(21) With regard to claim 35, Rowan et al. also discloses wherein receiving the receive sum signal includes a differential signal from a copper transport medium (pg. 7, lines 4-21).

(22) With regard to claim 36, claim 36 inherits all limitations of claim 34 above. Furthermore, Rowan et al. also discloses wherein receiving the receive sum signal includes receiving an optical signal (abstract).

(23) With regard to claim 37, claim 37 inherits all limitations of claim 34 above. Furthermore, Rowan et al. also discloses wherein down-converting the received sum signal includes receiving a symbol transmitted at a corresponding carrier frequency (pg. 14, lines 7-15; 22, -29).

(24) With regard to claim 38, Rowan et al. also discloses providing automatic power control (pg. 7, lines 18-21).

(25) With regard to claim 39, Rowan et al. also discloses in Fig. 9B, the method further including analog-to-digital (918A) conversion.

(26) With regard to claim 40, Rowan et al. also discloses in Fig. 9B, anti-aliasing filtering prior to analog-to-digital conversion.

(27) With regard to claim 43, Rowan et al. discloses in Fig. 11, wherein decoding the equalized symbols includes trellis decoding and QAM decoding.

(28) With regard to claim 44, Rowan et al. also discloses in Figs. 1-5, a system for communication between components, comprising: means (200) for allocating N bits of input data into K subsets; means for encoding each of the K subsets (302); and means for transmitting each of the K subsets into one of K channels (claims 1, 7 and 8).

(29) With regard to claim 45, Rowan et al. also discloses in Fig. 10, means for receiving data from the K channels (1000A); means for retrieving the K subsets (1002); and means for retrieving the N data bits (1004).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 7-8, 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rowan et al. (WO 99/45683) as applied to claims 1 and 4 above in view of Frenkel (US Patent 5,838,268).

(1) As noted above, Rowan et al. discloses all limitations of claim 4 above. He does not however disclose the system including a digital filter coupled between the symbol mapper and the digital-to analog converter.

However Frenkel teaches in Fig. 1, an apparatus and method for modulation and demodulation system, which includes a digital filter, coupled between the symbol mapper and the digital-to analog converter.

Therefore it would have been obvious to one skilled in the art to incorporate the invention of Frenkel with that of Rowan et al. as a method of improved modulating and demodulating of data (col. 2, lines 25-34).

(2) With regard to claim 8, Frenkel also discloses a low-pass filter (20) coupled between the digital-to-analog converter (50) and the up converter (40) (col.14, lines 28-44).

(3) With regard to claim 10, Rowan et al. discloses wherein the transmission medium is a copper backplane and the transmitter includes a differential output driver (col. 8, lines 39-51).

(4) With regard to claim 11, Rowan et al. also discloses wherein the transmission medium is FR4 copper trace and the transmitter includes a differential output driver (col. 8, lines 39-51).

8. Claims 16, 17, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rowan et al. (WO 99/45683) as applied to claim 15 above in view of van Nguyen (US Patent 6,462,679 B1).

(1) With regard to claim 16, claim 16 inherits all limitations of claim 15 above. As noted above, Rowan et al. discloses all limitations of claim 15. He does not however disclose wherein the receiver further includes an input buffer coupled between the K demodulators and the transmission medium.

However, van Nguyen discloses in Fig. 5, wherein the receiver further includes an input buffer coupled (202) between a demodulator and the transmission medium.

Therefore it would have been obvious for one skilled in the art to combine the teaching so van Nguyen with those of Rowan et al. as a method to store data long enough for clock generation (col. 5, lines 27-44).

(2) With regard to claim 17, van Nguyen also discloses wherein the input buffer receives a differential receive sum signal (col. 5, lines 5-26)

(3) With regard to claim 18, Rowan et al. also discloses the system incorporating an optical signal (abstract).

9. Claim 46-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rowan et al. (WO 99/45683) in view of Widmer (US Patent 6,496,540 B1).

(1) With regard to claim 46, Rowan et al. disclose in Figs. 1, a transmitter portion (102), the transmitter portion coupled to receive N parallel bits of data and transmit the N parallel bits of data into a first set of K frequency separated channels (110A-110N) on a transmission medium, where N and K are integers, and a receiver portion (106) coupled to receive data from a second set of K frequency separated channels from the transmission medium and recover the N parallel bits of data (pg. 3, line 22 –pg. 4, line 10).

Rowan et al. does not explicitly disclose the transmitter and receiver comprising a transceiver chip. However, Widmer (US Patent 6,496,540 B1) discloses a transceiver chip for parallel data transmission (col. 1, lines13-42). Therefore applying a transmitter and receiver on a transceiver chip would not be considered novel especially in fiber-optical design.

(2) With regard to claim 47, claim 47 inherits all limitations of claim 46. Furthermore, Rowan et al. also discloses wherein the first set of K frequency separated channels have substantially identical carrier frequencies with the second set of K frequency separated

channels (pg. 7, lines 4-21).

(3) With regard to claim 48, Rowan et al. also discloses in Figs. 2-5, wherein the transmitter comprises: a bit allocation circuit that receives the N parallel bits of data and creates K subsets of data bits, and K modulators, (330A-K) wherein each of the K modulators encodes one of the K subsets of the N parallel bits of data and creates an output signal modulated at a carrier frequency associated with one of the first set of K frequency separated channels; and an adder (502) that receives the output signal from each of the K modulators and generates a transmit sum signal (212) for transmission on the transmission medium (pg. 6, lines 28 - pg. 7, line 21).

(4) With regard to claim 49, Rowan et al. also discloses in Figs. 3, 5, wherein at least one of the K modulators includes a data encoder (302A) that receives the one of the K subsets of the N parallel bits of data associated with the at least one of the K modulators and outputs an encoded signal; a symbol mapper (though Rowan et al. is silent as to a symbol mapper, it is well known in the art that QAM incorporates the use of a symbol mapper) coupled to receive the encoded signal and output a symbol; and an up-converter (500A-500K) coupled to receive symbols from the symbol mapper and generate the output signal, wherein the up-converter (Fig. 8) outputs data at the carrier frequency of one of the K frequency separate channels that corresponds with the at least one of the K modulators (pg. 4, lines 1-10).

(5) With regard to claim 50, Rowan et al. also discloses in Fig. 4, wherein the encoder is a trellis encoder (406) and the symbol mapper is a QAM symbol mapper (pg. 9, lines 17-24).

(6) With regard to claim 51, Rowan et al. discloses in Figs. 12, 12, wherein the receiver comprises: K demodulators (1000A-K), each of the K demodulators coupled to receive a signal

from the transmission medium (712A-K), the signal being the transmit sum signal transmitted through the transmission medium, and retrieving one of the K subsets of data bits; a bit parsing circuit (1003) that receives each of the K subsets of data bits from the K demodulators and reconstructs the N data bits transmitted by the transmitter (pg. 15, lines 3-12).

(7) With regard to claim 52, claim 52 inherits all limitations of claim 51. Furthermore, Rowan et al. discloses in Figs. 9B, 11, wherein at least one of the K demodulators comprises: a down-conversion circuit (912A) that receives the signal from the transmission medium and generates a symbol by converting the signal at the carrier frequency appropriate for the one of the K demodulators; an equalizer circuit (914A) coupled to receive the symbol from the down-conversion circuit and create an equalized symbol; and a decoder (1100) which receives the equalized symbol and retrieves the one of the K subsets of bits associated with the at least one of the K demodulators.

Allowable Subject Matter

10. Claims 9, 21-26, 41-42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a communications method and system for high data rate transmission. A search of prior art records has failed to disclose a method or system " wherein the up-converter generates a first signal by multiplying the in-phase portion of the complex

symbol by a sine function of the carrier frequency, generates a second signal by multiplying the out-of-phase portion of the complex symbol by a cosine function of the carrier frequency, and summing the first signal with the second signal to generate the output signal " or "including an anti-aliasing filter coupled between the down-converter and the analog-to-digital converter" as taught in claims 9 and 21, respectively. The prior art also fails to teach "providing adaptively controlled filtering for timing recovery" or "wherein the symbols are complex and further providing adaptively controlled phase rotation as taught in claims 41 and 42.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Ziegler et al. discloses in US 2003/0112798 A1 a Data Communication Method.

b.) Hendrickson et al. discloses in US 2002/0093994 A1 a Reverse Data De-Skew Method and System.

c.) Scott discloses in US Patent 4,710,992 Apparatus and Associated Methods For Converting Serial Data Pattern Signals Transmitted or Suitable For Transmission Over a High speed Synchronous Serial Transmission Media, To Parallel Pattern Output Signals.

d.) Scott discloses in US Patent 5,079,770 Apparatus and Associated Methods For Converting Serial Data Pattern Signals Transmitted or Suitable For Transmission Over a High speed Synchronous Serial Transmission Media, To Parallel Pattern Output Signals.

e.) Shimizu discloses in US Patent 5,293,378 Parallel Multi-Line Packet Transmission System.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

lbw
March 4, 2005

Amanda Le
AMANDA T. LE
PRIMARY EXAMINER

OMB No. 0651-0011

INFORMATION DISCLOSURE CITATION

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Atty. Docket No.	9146.0001	Appln. No.	09/904,432
Applicant	Sreen RAGHAVAN		
Filing Date	July 11, 2001	Group:	2681

U.S. PATENT DOCUMENTS

Examiner Initial*		Document Number	Issue Date	Name	Class	Sub Class	Filing Date If Appropriate
LH		5,796,783	Aug 18, 1998	Crawford			
LH		5,999,575	Dec 7, 1999	Tanaka et al.			
LH		6,246,664 B1	Jun 12, 2001	Böhm			

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		Document Number	Publication Date	Country	Class	Sub Class	Translation Yes or No
LH		WO 99/45683	Sep 10, 1999	PCT			
LH		EP 0 554 056 A2	Aug 4, 1993	EPO			

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

Examiner Lawrence Ho	Date Considered 03/04/05

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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Notice of References Cited	Application/Control No. 09/904,432	Applicant(s)/Patent Under Reexamination RAGHAVAN, SREEN	
	Examiner Lawrence B Williams	Art Unit 2634	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-2003/0112798 A1	06-2003	Ziegler et al.	370/366
	B	US-2002/0093994 A1	07-2002	Hendrickson et al.	370/536
	C	US-5,079,770	01-1992	Scott, Paul H.	370/536
	D	US-4,710,922	12-1987	Scott, Paul H.	370/535
	E	US-5,293,378	03-1994	Shimizu, Hiroshi	370/474
	F	US-6,496,540 B1	12-2002	Widmer, Albert X.	375/242
	G	US-6,462,679 B1	10-2002	Van Nguyen, Cap	341/50
	H	US-5,838,268 A	11-1998	Frenkel, Liron	341/111
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	J	US-			
	K	US-			
	L	US-			
	M	US-			

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	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.